

Notice of Allowability

Application No.

10/656,529

Applicant(s)

BREAULT ET AL.

Examiner

Art Unit

Mark Ruthkosky

1745

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to 727/2005.
2. ☒ The allowed claim(s) is/are 22-27.
3. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some* c) ☐ None of the:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.

THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
- (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
- 1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
- (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.
- Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☐ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3. ☐ Information Disclosure Statements (PTO-1449 or PTO/SB/08), Paper No./Mail Date _____
4. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
5. ☐ Notice of Informal Patent Application (PTO-152)
6. ☐ Interview Summary (PTO-413), Paper No./Mail Date _____
7. ☒ Examiner's Amendment/Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☐ Other _____

Mark Ruthkosky 10/17/05
MARK RUTHKOSKY
PRIMARY EXAMINER

DETAILED ACTION

Response to Amendment

The applicant response filed 7/29/2005 has been considered. Claims 28-30 have been canceled. Claims 22-27 are allowed.

Claim Rejections - 35 USC § 112

The rejection of claims 1-21 under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention has been overcome by the applicant's amendment canceling the claims.

Claim Rejections - 35 USC § 102

The rejection of claims 1 and 3-5 under 35 U.S.C. 102(e) as being anticipated by Thompson et al., (US 2004/003396 A1) has been overcome by the applicant's amendment canceling the claims.

Allowable Subject Matter

Claims 22-27 are allowed.

The following is an examiner's statement of reasons for allowance:

The instant claims are to a method for operating a fuel cell system, the system including a stack of PEM fuel cells including at least one cooler for carrying antifreeze through the stack to remove heat, the fuel cell system further including a water circulation system for accumulating

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water and circulating that water through water flow passages passing through each cell, wherein, at the time of start-up, the stack has frozen water therein and there is insufficient liquid water within the water circulation system to enable the circulation of water, the method for operating the fuel cell system including (a) starting up and operating the frozen stack by introducing non-humidified reactants into the cells and connecting a load across the stack to generate heat to increase the stack temperature to above 0 °C and thereby melt frozen water within the stack, including accumulating liquid water during stack operation until there is sufficient liquid water to enable circulation of liquid water through the cell water flow passages, and thereafter circulating that water through the water flow passages to provide humidification for the cells, and, (b) at a stack operating temperature above 0 °C, initiating and maintaining the circulation of antifreeze through the stack cooler to prevent the operating temperature of the stack from increasing beyond a preselected temperature during the period of operation of the stack prior to said step of circulating the water, said preselected temperature being selected to prevent the cells from drying out during said period of operation, and (c) allowing the stack operating temperature to increase above that preselected temperature after water circulation through the water flow passages has begun, and (d) shutting down the stack and, upon shutdown, draining liquid water from the cell water flow passages before it freezes. The preamble of the method is given patentable weight, as the features of the preamble are included with the method steps.

The prior art does not teach a method for operating a fuel cell including these method steps. The most pertinent prior art has been presented. For example, Thompson et al. discloses a method of operating a fuel cell, which has been frozen. The fuel cell is preferably a polymer exchange membrane (PEM) fuel cell and includes conventional water transport plates and

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coolant. When the fuel cell is shut down, water from the cell inlets areas and water from reactant flow fields is removed by purging the cell with dry gas. When the cell is started from a frozen state, dry reactants are provided to the cell. An exothermic reaction that facilitates thawing of the fuel cell results. Coolant circulates when the cathode outlet temperature is greater than 50 °C. Thompson does not teach the steps included in the instant claims including the steps of starting up and operating the frozen stack by introducing non-humidified reactants into the cells and connecting a load across the stack to generate heat to increase the stack temperature to above 0 °C and thereby melt frozen water within the stack, including accumulating liquid water during stack operation until there is sufficient liquid water to enable circulation of liquid water through the cell water flow passages, and thereafter circulating that water through the water flow passages to provide humidification for the cells, and, (b) at a stack operating temperature above 0 °C, initiating and maintaining the circulation of antifreeze through the stack cooler. As the method is not taught in the prior art or obvious over the prior art as a whole, the claims are allowed.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Examiner Correspondence

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Mark Ruthkosky whose telephone number is 571-272-1291. The

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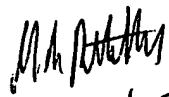
examiner can normally be reached on FLEX schedule (generally, Monday-Thursday from 9:00-6:30.) If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Ryan can be reached at 571-272-1292. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free.)

Mark Ruthkosky

Primary Patent Examiner

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10/17/05